Volunteer Firemen

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JANUARY

1940

NATIONAL FIRE PROTECTION ASSOCIATION
INTERNATIONAL
60 Batterymarch Street Boston, Massachusetts

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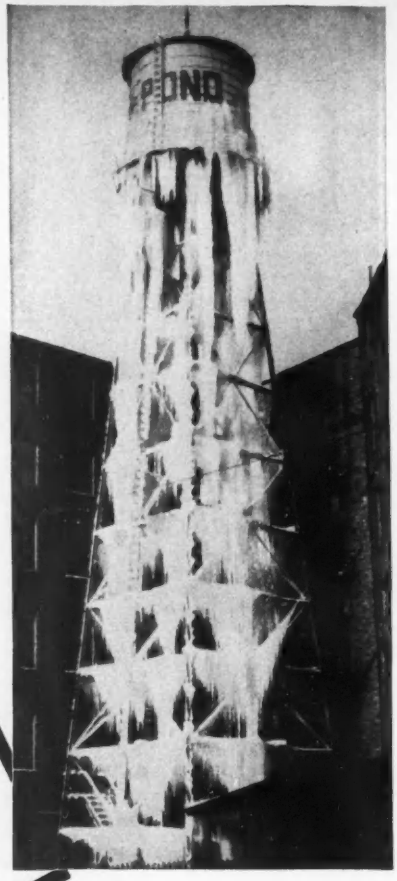
WATER FREEZES

AT 32° FAHRENHEIT



...and water in a sprinkler system is no exception to this fundamental law—which accounts for our annual winter epidemics of needless fire and water losses in sprinklered properties due to freezing...losses which a few simple precautions could so easily prevent.

Frozen sprinkler tanks, leaks from bursting pipes, disastrous fires because sprinklers are shut off to prevent freezing—these are the chief dangers to contend with. And the best safeguard against losses from these causes is A.D.T. Sprinkler Supervisory and Waterflow Alarm Service, which automatically detects trouble conditions in time to correct them *before* serious damage results. This service also makes the sprinkler an automatic fire alarm, summoning the fire department the instant a sprinkler head opens or serious leak occurs.

When you "roll" to an alarm from an A.D.T. supervised sprinkler system, you have assurance that you will find the system in effective operating condition, and that the alarm was transmitted promptly and accurately, without the delays that so frequently occur when detection and reporting of fires is entrusted to the human element.

A. D. T. SPRINKLER SUPERVISORY AND WATERFLOW ALARM SERVICE

Controlled Companies of **AMERICAN DISTRICT TELEGRAPH CO.** *155 Sixth Avenue, New York, N. Y.*

CENTRAL STATION OFFICES IN ALL PRINCIPAL CITIES OF THE U. S.

A·D·T

Electric Protection Services

AGAINST FIRE · BURGLARY · HOLDUP

A NATION-WIDE ORGANIZATION

Volunteer Firemen

National Fire Protection Association

ON THE cover this month is a picture of a dwelling fire in Waltham, Mass. Firemen were not called until the house was completely involved and it burned to the ground while they were laying more than a half mile of hose in an attempt to get water. Acting Chief Bertram Neal reports that the house would probably have been a total loss even had there been water immediately available. It was in a remote section. There was no one at home and the fire was not discovered until flames shot high enough in the air to be seen at a distance.

IN HIS war emergency Bulletin No. 4, W. J. Scott, Fire Marshal of the Province of Ontario, calls attention to the following news dispatch which shows the importance of fire departments now that the front lines in warfare have been moved back to the cities and towns: "Helsingfors, November 30. Russian bombing planes set the southwestern section of Helsingfors afire today. After Soviet bombers roared over the capital in successive raids, the evening sky was red with the glare of burning buildings. In one section where most of the bombs fell an area of twelve blocks was blazing and windows were shattered over an area a mile square. Apartment houses were burning fiercely near the heart of the city. The fires had started inside due to the penetrating qualities of the bombs. The flare from the burning buildings kept the city lighted all night."

THE N.F.P.A. field service reports that as of December, 1939, 658 cities in the United States prohibit the fire-breeding wooden shingle roof throughout their entire city limits. The figure may not include many very small communities which also prohibit wooden shingle roofs or the substantial number of cities which prohibit such roofs within the fire limits.

A QUESTION and answer manual has been prepared by the Union Fire Association of Lower Merion, Pa., and distributed to members of that volunteer fire department. Early this month an examination will be held. Members will be ranked according to their knowledge after the examination and five prizes totaling $75 will be given to those gaining top standing. Later in the year the association intends to issue a more advanced set of questions and answers in another manual.

MAY we have an expression from our readers regarding the desirability of a meeting of the N.F.P.A. Volunteer Firemen's Section? A meeting representative of volunteer firemen on a national scale has never before been attempted. This year the N.F.P.A. meets at Atlantic City, New Jersey, within easy driving distance of the members of several thousand volunteer departments. A session devoted to the volunteers' problems will be scheduled as a part of the meeting program if sufficient members of the section want it.

VOLUNTEER FIREMEN

Volume 7 Number 1

Published by the National Fire Protection Association, a voluntary non-profit organization, 60 Batterymarch Street, Boston, Mass.

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The answer to the problem question for December is on page 7.

ONE of the fundamental principles of fire protection is that stairways in a building be surrounded by masonry partitions with self-closing doors. This is to prevent fire spreading from one floor to another and to enable occupants to use the stairways as a means of exit. The importance of enclosed stairways is graphically illustrated in an interesting fire report recently made by the Indiana Inspection Bureau. There were nine guests in the St. Nicholas Hotel in Terre Haute, Ind., the night of November 20. It was a small three-story brick building. Just after midnight fire in the first floor was discovered. Five guests on upper floors were gotten out but four were trapped as fire spread up the one open stairway. Of those trapped two were rescued, two suffocated.

AN elementary principle is to project nitrocellulose motion picture films only from an incombustible and properly vented booth. The possibilities of disaster from ignoring this principle are illustrated in the story sent in by a contributor to the Pyrene Prize Letter Contest this month. This story won a prize because a fire extinguisher of the proper type was effectively used to control the fire, but what kind of prize is in order for the fellow who set up the machine without a booth?

THE estimated U. S. fire loss for November, 1939, according to the National Board of Fire Underwriters is $27,248,160. This figure is based on notices of incurred loss received by companies members of the board, plus an allowance for unreported and uninsured losses. Losses for the first eleven months of 1939 are $16,248,584 ahead of the losses for the same eleven months of 1938. The following table shows the losses for each month of 1938 and for the first eleven months of 1939:

	1938	1939
January	$27,676,337	$27,615,316
February	26,472,626	29,303,520
March	29,030,968	30,682,168
April	25,616,112	27,061,522
May	22,917,577	27,031,700
June	19,473,617	24,190,700
July	20,434,688	22,468,304
August	20,821,184	22,800,500
September	23,372,528	22,837,250
October	24,797,624	24,300,500
November	28,658,695	27,248,160
Total 11 months	269,271,956	285,539,640
December	32,758,044	
Total 12 months	$302,030,000	

Demonstration of big streams at Tenth Annual Texas Firemen's Training School, Agricultural and Mechanical College of Texas, July 17 to 21, 1939.

FIREMEN'S TRAINING

Outstanding in Past Year Is Development of Definite Measured Courses of Training in 17 States

THE past year's work in firemen's training is notable because about 10,000 firemen completed one or more units of definite, measured courses of instruction now offered in 17 states. These courses were in many cases not available a year ago.

Annual short courses were held in 26 states and two Canadian provinces, Ontario and Pennsylvania being on the list for the first time this year. Regional district short courses were held in 11 states and British Columbia. Training was given in over 1000 departments by field instructors.

Nearly all of these training programs have been designed for the volunteer or part-paid fire department. In addition there has been growth of training in departments with drill towers, drillmasters and an established training program. No compilation has been attempted of these purely local training efforts, but there are figures available from several states which indicate that the amount of such work is very considerable. Much of this work is inspired by and carried out by men who have been to the schools sponsored by the state program. In Connecticut, for example, it is estimated that the men training at the state schools have given instruction to 2,600 other firemen. New York State's system of zone schools brings men from neighboring communities in to established drill schools at the larger cities.

A tabulation of a few states where estimates of the number of firemen given some local training are available follows:

Colorado	1,700
Connecticut	2,600
Indiana	710
Kentucky	460
Massachusetts	1,630
Mississippi	200
New York	2,740
Texas	6,750
Virginia	800

This partial list totals nearly 15,000. It covers only training work over and above that summarized in the other accompanying tables.

From these tabulations and estimates it appears that in 1939 over 70,000 firemen received training, an increase of 20,000 from the estimate of last year.

REGIONAL OR DISTRICT SHORT COURSES

	No. Schools	No Days Sessions Each	Cities Represented	1939 Attendance
Arkansas*	3	6	—	18
British Columbia	4	—	19	136
Georgia	3	3	20	230
Indiana	101	1-2	225	4,194
Iowa	7	1	140	690
Kentucky	1	2	30	172
Louisiana*	11	5	35	357
Minnesota	8	1-2	425	1,393
Nebraska	4	1	70	345
North Dakota	5	1	91	869
Oklahoma*	4	5	34	62
Vermont	2	6	—	225
Washington	10	1	—	641
Totals	163			9,332

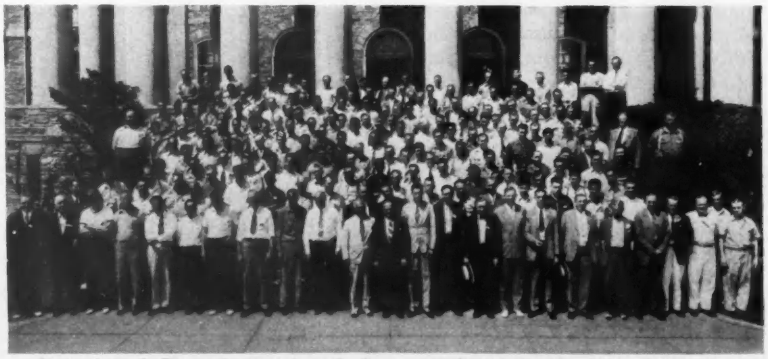
*Teacher-training courses

ANNUAL SHORT COURSES

	Years Held	Cities Represented	1939 Attendance
Alabama	3	10	15
British Columbia	6	26	154
Colorado	9	49	264
Florida	10	45	177
Georgia	5	72	509
Illinois	15	137	542
Indiana	6	121	833
Iowa	15	100	434
Kansas	9	46	136
Louisiana	10	40	52
Maryland	10	66	186
Michigan	11	108	388
Minnesota	12	60	159
Mississippi	5	30	92
Missouri (S. E.)	10	35	104
Missouri (Cent.)	7	42	113
Nebraska	2	50	212
New Mexico	10	34	167
North Carolina	11	67	266
Oklahoma	14	33	48
Ontario	1	31	76
Oregon	10	46	300
Pennsylvania	1	85	196
South Dakota	10	75	622
Texas	10	269	563
Washington	9	121	350
West Virginia	9	69	182
Wisconsin	6	73	332
Wyoming	8	—	125
Total Attendance			7,597

WORK OF FIELD INSTRUCTORS

	No. Depts. Visited	Ave. Hours Instruction Each Dept.	Total Men Reached
Colorado	126	3½	1,702
Illinois	176	4	2,253
Indiana	23	12	434
Kentucky	7	20	125
Massachusetts	42	20	1,272
Nevada	24	12	424
New York Nassau County	60	20	9,046
Ontario	8	2	160
Quebec	260	5	5,200
Tennessee	45	10	615
Texas	329	5	5,075
Utah	—	—	—
Wyoming	15	30	593
Total Attendance			26,899



First Annual Firemen's Training Conference conducted by the State Public Service Institute at Pennsylvania State College, August 28 to September 1, 1939.

The courses designated as "comprehensive" for want of a better term are the big news this year. They may be illustrated by describing the setup of Arkansas, first state on the list in the accompanying table.

The program is known as the Arkansas State Fire College sponsored by five agencies, the State Department of Trade and Industrial Education, the Arkansas Fire Prevention Bureau, the Arkansas Municipal League, the Arkansas State Firemen's Association and the University of Arkansas. It operates under an advisory committee of six, five of whom are fire chiefs. Assistant Chief Carl S. Smalley, State Supervisor of Fire Training, administers the program.

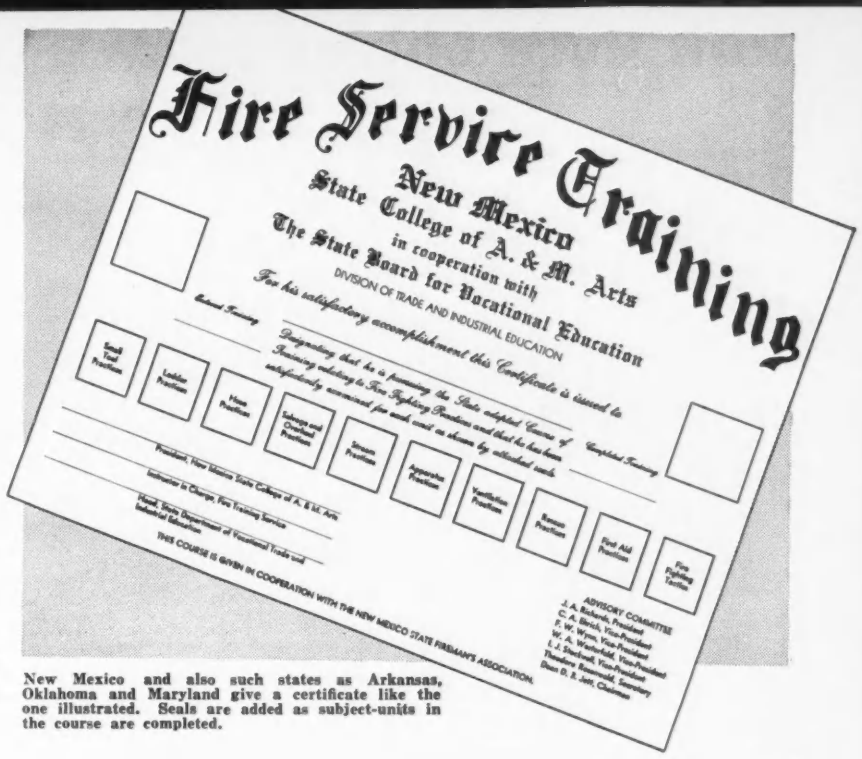
The college offers an introductory course of ten hours. This is usually given by the supervisor or an instructor whose services are available to any fire department on request. He spends three or four days in the town. The fire department members meet with him on successive afternoons or evenings until he has completed 10 clock-hours of demonstration and instruction. Usually it takes three or four afternoons or evenings to complete the introductory unit course.

The introductory course is a sampling course, "once over lightly" touching briefly on elementary hose and ladder work and fire prevention. The advanced course is really a continuation of the introductory course. It consists of the following subject-units.

1. Small Tools
2. Hose
3. Ladders
4. Fire Streams
5. Salvage
6. Overhaul
7. Ventilation
8. Apparatus
9. Fire Fighting Tactics
10. Rescue and First Aid
11. Inspection

Each of these requires a minimum of 6 clock-hours demonstration and instruction. They may be given in a local department in the same manner as the introductory course, but it is expected that most of the advanced instruction will be given at regional schools. The introductory course where requested, is provided for the entire department. It is left to the individual fireman's own initiative to seek the "advanced" instruction and classes will probably be organized wherever there is a sufficient number interested. A staff of instructors is being developed through teacher training courses.

Similar programs in other states have differences in number of hours and arrangement of subject-units as shown in the table. Differences are due mainly to local conditions.


Fire Service Training
New Mexico
State College of A. & M. Arts
in cooperation with
The State Board for Vocational Education
DIVISION OF TRADE AND INDUSTRIAL EDUCATION
For his satisfactory accomplishment this Certificate is issued to
Completed Training
Small Tool Position
Ladder Position
Hose Position
Salvage and Overhaul Position
Streams Position
Apparatus Position
Ventilation Position
Rescue Position
First Aid Position
Fire Fighting Tactics
President, New Mexico State College of A. & M. Arts
Instructor in Charge, Fire Training Service
Head, State Department of Vocational Trade and Industrial Education
THIS COURSE IS GIVEN IN COOPERATION WITH THE NEW MEXICO STATE FIREMAN'S ASSOCIATION
ADVISORY COMMITTEE
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Theodore Roosevelt, Secretary
Jean D. S. Jett, Chairman

New Mexico and also such states as Arkansas, Oklahoma and Maryland give a certificate like the one illustrated. Seals are added as subject-units in the course are completed.

COMPREHENSIVE TRAINING COURSES

	Total Hours In Course	No. Units In Course	No. Units in which Instruction Was Given 1939	Departments Represented in Classes	No. Men Completing One or More Units 1939
Arkansas					
Introductory	10	1	1	21	273
Advanced	66	11	1	28	245
California	—	16	3	163	2,687
Connecticut	30	3	3	61	224
Delaware	144	48	10	10	84
Georgia	—	28	—	2	120
Louisiana	60	13	13	—	568
Maryland	40	—	—	91	632
Massachusetts					
Elementary	20	—	—	—	368
Advanced	40	14	14	74	308
New Jersey					
South Jersey	84	28	28	—	165
Morris Co.	30	—	—	28	94
Union Co.	32	—	—	9	120
New York	—	—	—	34	178
Nassau Co.	20	—	—	60	901
New Mexico	10	—	—	8	86
Ohio	36	12	12	7	103
Oklahoma					
Introductory	10	—	—	28	310
Advanced	76	10	6	15	224
Pennsylvania	45	12	12	115	1,243
Virginia	30	—	—	25	525
West Virginia	60	15	15	18	338
Total Attendance					9,796

HOW MUCH DO YOU KNOW ABOUT *Dust Explosions?*

This picture shows all that remained of a wood-frame, metal clad grain elevator in Newport News, Virginia, after a dust explosion and fire. While modern elevators are generally far more safely constructed, the tremendous force that caused this destruction still finds many places where it can work its violence.

THE following 25 true or false statements have been selected from a quiz given at the Pennsylvania State Firemen's Training Conference by Dr. David J. Price, Vice President of the N.F.P.A. and the nation's No. 1 authority on dust explosions. Dr. Price is Principal Engineer in Charge of the Chemical Engineering Research Division of the U. S. Department of Agriculture, Bureau of Agricultural Chemistry and Engineering.

Read each of the statements carefully. If it is correct, or true, underline the word "true" at the end; if it is incorrect, or false, underline the word "false." When you have completed the quiz, turn to page 11 and check yourself with the correct answers. If you get more than 20 correct, you are exceptionally well informed.

(1) The dust explosion hazard exists in only a few industrial plants in the United States. True False

(2) Powdered milk, cocoa, soap and wood dusts are not likely to create dust explosion hazards. True False

(3) Street dust, rock dust, limestone dust and cement dust, when mixed with air, are highly explosive. True False

(4) Firemen are seldom exposed to the hazard of dust explosions while fighting fires in woodworking plants. True False

(5) A full stream of water at high pressure should never be used for fighting fire in enclosed places where there is an accumulation of settled or static dust. True False

(6) Dust or powdered products in bins or other enclosures should not be removed during the course of a fire in or near the bins or enclosures unless the material has been thoroughly wet down by means of a spray nozzle. True False

(7) The falling of floors or the dropping of the bottom of storage bins where dust is present is not particularly dangerous from a dust explosion standpoint if firemen are directing one or more good streams of water on to the fire below. True False

(8) In order to cool down a fire in or near powdered metals such as aluminum, water should be directed on to the hot metal. True False

(9) A dust explosion cannot occur when the relative humidity or moisture content of the air is very high. True False

(10) The destruction resulting from a dust explosion is caused by the expansion of the air and the products of combustion resulting from the burning of a dust cloud. True False

(11) It is practical to prevent the destruction of a building by a dust explosion by designing the building to withstand heavy pressures. True False

(12) A dust explosion can occur in a building where no manufacturing is done. True False

(13) Cleanliness and good housekeeping are big factors in reducing the dust explosion hazard and minimizing losses. True False

(14) Power transmission belts, conveyor belts and ducts of air conveying systems should not be electrically grounded. True False

(15) Sufficient reduction of the oxygen content of the air in an enclosed grinding or conveying system by means of the introduction of an inert gas such as carbon dioxide will in most cases retard or prevent a dust explosion. True False

(16) Diagonal scoring on the outside surface of window glass will reduce the pressure at which the glass will be blown out by an explosion and the vent thus created will reduce structural damage to buildings. True False

(17) In order to produce a dust explosion it is not necessary for a source of ignition to be present. True False

(18) An ordinary drop cord electric light is the safest appliance for use in examining bins in which grain, sawdust and other dusty products are being stored. True False

(19) A dust explosion is a very rapid burning of a combustible dust in suspension in air. True False

(20) If water is thrown onto burning aluminum or magnesium powder, hydrogen from the water will be released and will burn and oxygen from the water will intensify the fire by combining chemically with the aluminum or magnesium. True False

(21) If dust shaken from a cheesecloth bag burns when it comes in contact with an open flame, it is an indication that the same kind of dust may explode when mixed with air in proper proportions and ignited. True False

(22) The breaking of a lighted electric lamp globe in a dusty atmosphere can cause an explosion. True False

(23) Aluminum dust is much more explosive than shale dust. True False

(24) There is no such thing as a spontaneous dust explosion. True False

(25) Oil lanterns or torches may be used without danger when inspecting dusty rooms. True False

FIRES IN *Transformer Vaults*

By Victor H. Tousley

N.F.P.A. Electrical Field Engineer

POTENTIALLY a transformer is a dangerous fire hazard. It is a combination of high voltage electricity and flammable oil. The function of the transformer is to convert very high voltage electric current, which is economical for long distance transmission, to current at the relatively low voltages used for lighting and power in and around ordinary buildings. It does this through a series of windings on a metal core. The efficiency of the device is increased by immersing the core and windings in oil.

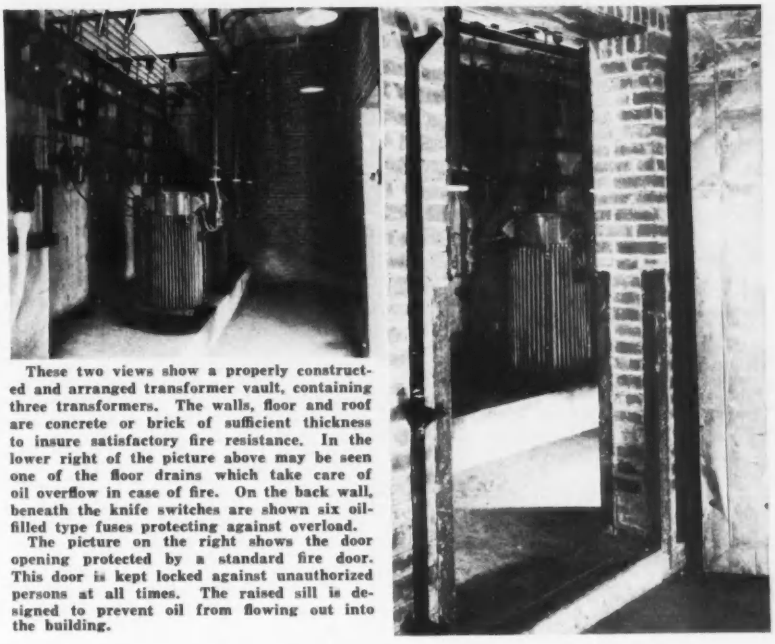
In its simplest form a transformer installation consists of the metal tank containing the transformer and the oil, and the necessary equipment to disconnect it and protect it against overloads, short circuits and electrical disturbances.

Most often, transformers are located out of doors, away from buildings, and guarded by high strong fences to keep out unauthorized persons. Lack of outdoor space, however, and the tendency of large building owners to provide their own transformers instead of relying on the substation for proper house voltage, has led to the installation of transformers in inside vaults.

The possibility of fire in a modern, well constructed transformer is not great, but if one occurs it is vitally important that someone on hand knows what to do about it. Improper fire fighting may result in undue damage to expensive electrical equipment and injury or death to the fire fighters.

THERE are a number of things which make a fire in a transformer inside a building a difficult one to fight. The National Electrical Code requires that where transformers are placed inside a building they must be located in a fire resistive enclosure which is kept locked at all times and made accessible only to authorized persons. This enclosure is of such construction that it will usually confine any fire or flames that result from the burning oil.

As heat is generated in the transformer during its normal operation, however, some form of ventilation must be provided, and openings in the vault enclosure are used for this purpose. It is the usual practice to so locate these openings that any flames which might issue from them will not come in contact with any combustible part of the building; and if conditions are such that ventilation cannot be obtained except to the inside of a building or close to combustible material, then a damper must be provided which will close automatically in case of fire inside the vault.



These two views show a properly constructed and arranged transformer vault, containing three transformers. The walls, floor and roof are concrete or brick of sufficient thickness to insure satisfactory fire resistance. In the lower right of the picture above may be seen one of the floor drains which take care of oil overflow in case of fire. On the back wall, beneath the knife switches are shown six oil-filled type fuses protecting against overload.

The picture on the right shows the door opening protected by a standard fire door. This door is kept locked against unauthorized persons at all times. The raised sill is designed to prevent oil from flowing out into the building.

In case of a serious fire in a transformer vault the heat from the flames tends to boil the oil in the transformer case, thus causing it to flow over on to the floor of the vault. To reduce this hazard a drain is usually placed in the vault floor connected to the sewer and arranged to drain any oil that may come from the transformers. As an additional safeguard a raised sill is used at the door opening so that oil cannot run out into the building.

IN fighting a fire in a transformer vault special precautions should be taken. If the vault is properly constructed, any fire in it should be automatically confined to the vault itself, and all that is necessary for the fire department is to protect any combustible material outside the vault that might become ignited. It ordinarily is neither advisable nor safe to play a hose stream inside the vault. About the only thing in the vault that can cause a serious fire is the oil. Water in the vault will tend to raise the level of the oil, stop its draining, and possibly cause it to run over the door ledge and enter the building proper. To open the door of the vault may allow the fire to spread into the building.

In case of fire, the utility company should be notified at once. Firemen should wait for its crew to arrive, protecting any property outside the vault that may be in danger.

If the vault is open, it is not usually advisable to attempt to enter it or to throw water or a foam stream on to the fire, for contact with the high potentials through the hose stream may give the men on the play pipe a fatal shock. If an extinguisher must be used near the electrical equipment, one suitable for use on electrical apparatus should be selected. This would be one of carbon tetrachloride, carbon dioxide or dry chemical type.

IF by any chance a person should come in contact with the high voltage and receive a shock, extreme care must be used in the rescue. Precautions should be taken not to come in contact with any high tension apparatus, and particularly not to touch the person being rescued except with a piece of dry timber, dry cloth, or other means that will protect the rescuer against also receiving a shock through the person being rescued.

When a person has been rescued, artificial respiration should be started at once and continued until it is thoroughly proven that there is no chance for resuscitation. It is well to remember that shocked persons have been restored with artificial respiration even after hours of apparently futile work.

A PILE OF STEEL TURNINGS PRESENTS

A Problem in Fire Fighting

IT has been observed that fire fighting is a job which cannot be learned by experience alone. There are certain fires which do not occur often enough to provide experience and where general information and common sense are the fireman's only guide.

The fire department in Lorain, Ohio, in late October, had a fire which illustrates this point. It presented a novel set of conditions. The fire is notable in one respect for carbon dioxide was used on a large scale in handling the fire, and in another because of the weird and conflicting advice offered on how to put it out.

For two years a huge pile of oily steel borings and turnings lay on a dock at Saginaw, Michigan. Early in October, 1939, 2400 tons of these turnings were brought by ship to a dock at Lorain, Ohio, there to await purchase.

When taken from the ship it was reported that the metal was heating, apparently spontaneously. On October 18, ten days after it was discharged from the ship at Lorain, smoke and acrid fumes were noticed issuing from the pile. By this time, through small purchases, the quantity of metal had dwindled to 1322 tons. The fire department, owners and insurance interests were notified but the fire department was instructed to withhold action until information could be obtained as to the proper method of attack. The burning pile was on a concrete floor retained on two sides by concrete walls 8 feet in height, and was too remote to endanger any surrounding property, other than a gantry crane and its track.

TWELVE days elapsed before any measures were taken to extinguish the fire, during which time various and sundry fire fighting methods were considered.

At about noon on October 30, plans for combating the fire were agreed upon and put into execution. The dock furnished a clam-shell bucket unloader and a tractor snow plow. The Lorain Fire Department furnished two shifts of six men each. The technique developed and used was to scoop into the burning pile with a clam-shell digger, pick up about three tons of hot turnings, and deposit the load on the dock away from the large pile. Carbon dioxide was sprayed almost continuously on the bucket to prevent possible damage by heat.

As soon as the clam-shell had dumped its contents on the dock, the snow plow scattered the hot metal which was then cooled down with carbon dioxide and water. Water was supplied through a fog nozzle from a hydrant located some 800 feet distant. Both hydrant connections were siamesed with a 2½ inch hose line. A pumper was not used.

THE process described was continued until the evening of November 1, when the turnings, well scattered, had practically ceased burning. Water was used all the following day and the fire was finally declared extinguished after having been fought for over fifty hours with five tons of carbon dioxide and an estimated 600,000 gallons of water.

It is reported that the fire was not spectacular. Although a large volume of smoke was emitted, flames burst forth only when the mass was disturbed, as by the digger. A pyrometer thrust about one foot into the burning pile recorded a temperature of 1700° Fahrenheit. The steel therefore did not reach the fusion point, and this conclusion was confirmed by the absence of slag after the fire was extinguished.

The market value of the pile of oily turnings was approximately $24,000 on the day of the fire. If the fire had been allowed to burn itself out, there would probably have been little if any salvage. As it was, probably two-thirds of the pile was saved. While fire extinguishing operations were unusually expensive there is no evidence that every one was not pretty well satisfied with the result. So the argument can now begin as to the general plan which should be followed in fighting fires of this type.

One scheme suggested for fighting the fire was to cover the pile with clay and pour carbon tetrachloride through a hole in the top. This plan was rejected because it was costly and would tend to impair the value of the stock. Another suggested scheme that was rejected consisted in making a hole in the top of the pile. Into this it was proposed to pour lime and then to throw water on the lime. This was supposed to produce steam to smother the fire.

It is a good thing that neither of these methods was tried out. Either would have been likely to result in serious injury. Violent reactions might have been expected in each case when the extinguishing agent came in contact with the hot metal.

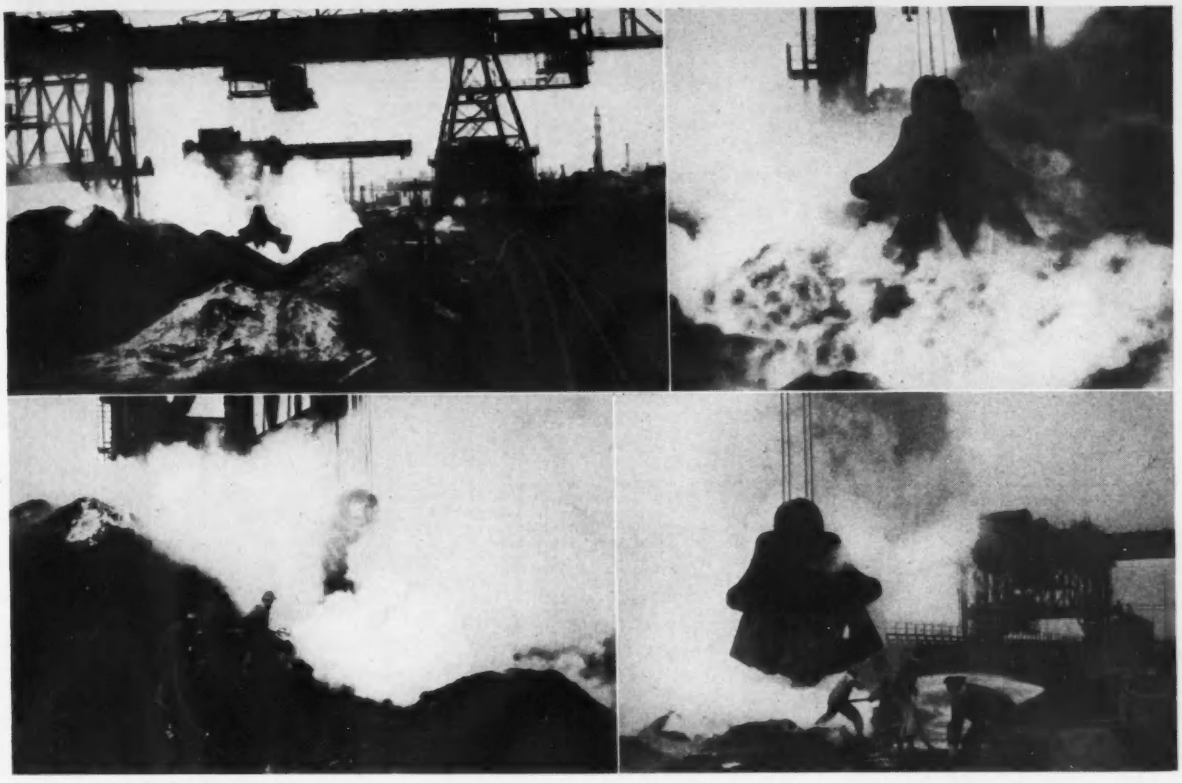
Practically every one whose advice was asked cautioned against the use of water in this fire. They were probably influenced by reports of previous experience with the use of water on fires in piles of scrap metal, particularly aluminum. Observers may have had in mind the demonstration of this fact by a fire in 1933 in a plant at Cuyahoga Heights not far from Lorain. A pile of borings of aluminum took fire. The fire department turned a hose stream on the middle of the pile. The result was a violent explosion.

As a practical matter, iron borings are relatively less dangerous than aluminum. Experience in fires in iron and steel turnings and borings has shown that water may often be used successfully. Most such fires which are on record have occurred in barrels or other small quantities of borings and turnings and have been extinguished successfully by the use of small hose streams or water-solution extinguishers. A fire under conditions comparable to the present case occurred in Detroit in June 1920 when a large pile of iron and steel borings and turnings took fire in a railroad yard. It burned for a week or more. That fire was controlled by the use of hose streams operated from a safe distance and, as in the present case, was finally extinguished by overhauling the pile using a power shovel.

The Lorain Fire Department was satisfied that it could handle this fire with water if the material was moved in small quantities. The problem was how to pick up small quantities of the material without serious heat damage to the conveyor.

Among those whose advice was sought regarding the fire was A. H. Nuckolls, Chemical Engineer, Underwriters' Laboratories, Inc., Chicago, Chairman of the N.F.P.A. Committee on Hazardous Chemicals and Explosives. Mr. Nuckolls suggested and made the necessary arrangements with the Cardox Corporation of Chicago for the use of

Thanks are due to the Ohio Inspection Bureau for a report on this fire by their inspector, V. M. DeMelto; to Chief David E. Hatt and Assistant Chief John J. O'Doherty of the Lorain Fire Department for details of the fire department operations; to the Cardox Corporation for pictures and data on how carbon dioxide was used; and to A. H. Nuckolls of Underwriters' Laboratories, Inc., Chicago, and A. B. Guise of the Factory Mutual Laboratories, Boston, for review and helpful criticisms of the manuscript.



Photos courtesy Cardox Corporation.
Upper left picture is a general view of the pile of steel borings showing the crane by means of which the pile was moved and the 7½ ton tank truck from which carbon dioxide gas was supplied. The upper right picture shows how the pile flared up at every "bite" of the clam-shell bucket. The lower left picture shows men applying carbon dioxide gas as a bite is taken at the pile. Lower right shows carbon dioxide and water spray being put on the turnings after they had been spread out to cool. Small dikes were built to retain the water and keep the repiled material wet.

carbon dioxide on the fire.

Mr. Nuckolls explains the fire fighting problem involved as follows:

"Water reacts readily with iron, particularly when finely divided, at a red heat or higher, with the formation of iron oxide and hydrogen. The hydrogen may then combine with explosive violence with the oxygen of the surrounding air.

"Further, when water is applied to red-hot iron, it is suddenly converted into vapor or steam, which occupies a much larger volume than the water in the liquid phase. In addition, the steam is expanded by the high temperature, according to the well known gas laws.

"There are, therefore, two sources of explosions when water is applied to red-hot iron: first, the chemical reaction forming hydrogen gas; second, the conversion of water into steam, which is then expanded by heat. The hydrogen reaction appears to be the more dangerous, particularly where the iron is comparatively finely divided, thus presenting a large area for the reactions mentioned; and the combination of the two processes may constitute a serious danger in practical work.

"Where the amount of iron involved in the fire is comparatively small, it may be practicable to apply a large enough volume of water to minimize the hazards mentioned above, but in the case of large piles of red-hot steel turnings such procedure is dangerous. Even at high rates of application of water (within practical fire department limits) to the surface of a large pile, the water reacts with the red-hot iron below the surface, thus producing internal pressure (from expanded steam), and also hydrogen flames and explosions as the surrounding air is contacted.

"Scooping into the burning piles with mechanical diggers during the application of water obviously does not remove this danger, as considerable masses of hot metal remain to react with the water.

"It is true that a comparatively high temperature (red heat and above) is necessary to obtain a dangerously sudden conversion of water into steam and a comparatively rapid reaction producing hydrogen, and therefore water can be comparatively safely applied to the metal after cooling it below a red heat.

"The application of carbon dioxide gas and snow functions to cool the hot metal, at the same time retarding the oxidation process, with the result that the portion of the metal exposed cools rapidly by radiation, conduction, etc. Digging into the pile without at the same time using means of retarding oxidation simply presents more hot metal surface to the oxygen of the air, thus promoting the oxidation of the iron and the burning of the distillation products of the oil, with the net result that the temperature of the mass may be even higher than before."

THE fire was finally extinguished, not by water or carbon dioxide, but by the simple process of overhauling the burning pile. With a clam-shell bucket the pile was pulled down a bite at a time. Each bite brought a relatively small amount of the burning material out in the open. Out there it lost its heat quickly and the temperature dropped to below the red heat after which it could be further cooled with hose streams in complete safety.

Carbon dioxide made available in large quantity played an important part in carrying out the overhauling operation. When the clam-shell took a bite at the pile, the hot metal flared up violently on reaching the air. This flare endangered the crane operator. The owners of the crane feared the clam-shell and crane would be damaged if used to overhaul the whole pile. That's where the carbon dioxide proved valuable. It could be poured on the clam-shell as it took each bite. It provided the cooling effect needed to protect the crane operator and equipment.

MILLION DOLLAR FIRES, 1930-1939.
Bristol Bay, Alaska Salmon Cannery, 1936
Tillamook County, Ore.- Forest Fire, 1933
Salem, Ore.-State Capitol, 1935
Pine Ridge, Ore.-Lumber Mill, 1938
Bandon, Ore.- Conflagration, 1936
Oakland, Calif.- Pier and Ferry, 1935
Southern California-Brush Fires, (2) 1935, Brush Fire, 1938
Menominee, Mich. Lumber Mill, 1931
Greenfield, Wis. Corn Mill, 1937
Chicago, Ill. Elevator & Racking House, 1932, Stockyards, 1934, Grain Elevator, 1939
Peoria, Ill. Whiskey Distillery, 1935
Springfield, Ill. State Arsenal, 1934
Near Owensboro, Ky. Whiskey Distillery, 1938
Birmingham, Ala. Department Store 1934
New Orleans, La. Wharf Warehouses (2) 1936
Port Alfred, Que. Pulpwood Pile, 1932
Buffalo, N.Y. Armory, 1931
Wellsville, N.Y. Oil Refinery, 1936
Rantoul, Ill. Army Airport, 1934
Cincinnati, Ohio Oil Fire (Flood) 1937
Altoona, Pa. R.R. Shops, 1937
Lexington, Ky. Whiskey Warehouse 1934
Newport News, Va. Steamship, 1931
Norfolk, Va. Conflagration, 1931
South River, N.J. Brick Plant 1934
Ellsworth, Me. Conflagration, 1933
Auburn, Me. Conflagration, 1933
Nashua, N.H. Conflagration, 1930
New London, Conn. Conflagration, 1938
New York, N.Y. Steamship, 1930, Pier and wharf 1932, Coney Island Conflagration, 1932
S.S. Morro Castle 1934
Bayonne, N.J. Refinery- 1930
Lakehurst, N.J. Zeppelin Hindenburg, 1937
Paulsboro, N.J. Linoleum Factory 1934
Fires which from the best estimates of loss available exceeded one million dollars each
National Fire Protection Association 60 Batterymarch St., Boston, Massachusetts.

From the best figures available it is estimated that $95,522,000 damage resulted from the 41 individual million dollar or greater losses recorded during the ten years, 1930-1939 inclusive. Thus the average loss from these great fires was $2,330,000. Of the 41 fires, 23 caused losses between 1 and 2 million dollars, 11 caused losses of between 2 and 3 million dollars, 6 caused losses of 3 to 5 million dollars, and one fire caused an estimated loss of twenty million dollars.

VOLUNTEER FIREMEN IN SEVENTH YEAR

Bigger Magazine and New Membership Plan

WE BEGIN with this issue the seventh year in the history of VOLUNTEER FIREMEN. To all of you who have made our growth possible, who have supported us and helped us become the magazine with the greatest circulation in the fire field, we extend our sincere appreciation. We do more than that: we offer you a bigger and better VOLUNTEER FIREMEN under the same membership plan that you are now enjoying. So that you may know the names of those fire companies which have made this possible we have listed the 695 departments holding membership in the N.F.P.A. Volunteer Firemen's Section on pages 12 and 13 of this issue.

For the many other departments which will want to receive this new VOLUNTEER FIREMEN, we are happy to retain the advantages of an economical membership plan especially designed for volunteer and industrial fire companies. VOLUNTEER FIREMEN is available only through a $10.00 membership in the N.F.P.A. Membership includes 10 copies of VOLUNTEER FIREMEN per month. Additional copies will be sent to the men of departments joining the section at $1.00 per year's subscription. Thus, at the cost of only $1.00 each, every man in the department may receive VOLUNTEER FIREMEN individually mailed to his home, and the department will receive at headquarters one complete set of all other regular N.F.P.A. material as published. No fire department library can be complete without this membership service.

From the beginning, VOLUNTEER FIREMEN has been developed through the cooperation and suggestions of our many fire department friends throughout the United States and Canada. We will continue to welcome comments on the appearance and contents of our new, 1940 issues.

We feel it is our duty to make VOLUNTEER FIREMEN just as practical and useful a publication as possible. It is our intention to merit and to hold the splendid appreciation which has made this improved issue possible and which we hope will lead to an even greater service in future years.

1000 SCHOOL FIRES

New Record Shows School Buildings Still Built to Burn

UNDER the title "1000 School Fires," the N.F.P.A. has published a 72-page, profusely illustrated, book bringing to light the disgraceful fire record of American schools. School fires that have been reported in sufficient detail to the N.F.P.A. since 1928 are tabulated according to cause, type of building, kind of school, causes of loss of life in school buildings, construction of buildings involved, loss per fire, room in which fire started, and the effect of automatic sprinklers.

The opening paragraph of the fire record states its purpose thus, "The public responsibility for safeguarding school children from fire is generally recognized; the fire record shows to what extent this responsibility has been met."

The report goes on to point out that while great improvement has been evident in the construction of school buildings, and old buildings are being made more fire safe, there are still many schools built and being built to burn. School fires continue at the rate of seven a day in the United States and Canada.

The N.F.P.A. has continually emphasized the importance of school fire safety, and has consistently advocated the construction of fire-resistive school buildings with proper exits, special fire protection for existing buildings, and particular care in fire prevention. The Association, through its Committee on Safety to Life, has issued a code for proper construction and exit arrangements of school buildings.

The tabular material in "1000 School Fires" is not a complete record of the thousands of school fires that have happened annually since 1928, but rather a compilation of typical fire experience. Eight major school disasters since 1900 in which a total of 694 persons perished are described in detail in the opening section. Most serious of all was the New London, Texas, gas explosion of March 18, 1937, which killed 294. It is interesting to note that this and the Sacred Heart College fire in St. Hyacinthe, Quebec, costing 46 lives (Jan. 18, 1938), are the most serious fires of the entire preceding decade. Thus they are fires of today, examples of what can happen now. The N.F.P.A. itemizes sixty school fires since 1900 in which loss of life occurred and gives brief summaries of some typical examples.

The ten tables in the statistical record include only fires which have occurred since 1928. Of the thousand included, 287 occurred in public elementary schools, 255 in public high and junior high schools, 257 in colleges, universities and normal schools, 127 in private schools and convents, 45 in parochial high and elementary schools, and 28 in business and trade schools. The principal causes were electrical defects, smoking and matches, incendiarism, defective heating equipment, spontaneous ignition, flammable liquids or gases, and defective flues or chimneys.

1000 School Fires ends with a general treatment of the subject of safety to life in school fires by Robert S. Moulton, Secretary of the N.F.P.A. Committee on Safety to Life. He points out that substantially all of the major loss of life in school fires in the past has been clearly due to violation of one or more of the cardinal principles of school fire safety as outlined in the N.F.P.A. Building Exits Code.

Member departments may secure a copy of 1000 School Fires free from the executive office. Additional copies and copies to non-members cost $.35 each.

THE Gamewell Company of Newton Upper Falls, Mass., has just issued and will send to anyone interested a new publication describing air raid alarm systems. Proper movement of the populace and operations of police, fire-fighting and military forces during an alarm depend on adequate notification. The systems described follow well-established and long-tested principles of alarm service.

A NEW 24-page catalog illustrating and describing many types of aluminum ladders especially suited for fire fighting has just been issued by the Aluminum Ladder Company, 376 Adams Street, Tarentum, Pa. Described are two- and three-section extension ladders running all the way up to 67½ feet, as well as roof ladders, folding ladders, pike poles, step ladders and stages.

ARTHUR G. SULLIVAN, well known in fire department circles in the United States and Canada, is the new Sales Manager of the Buffalo Fire Appliance Corporation of Buffalo, N. Y.

THE DuGas Engineering Corporation, 332 South LaSalle Street, Chicago, is now a wholly owned subsidiary of the Ansul Chemical Company of Marinette, Wis. The corporation is the sole licensee for DuGas dry chemical fire extinguishing equipment and for DuGas fire detecting systems.

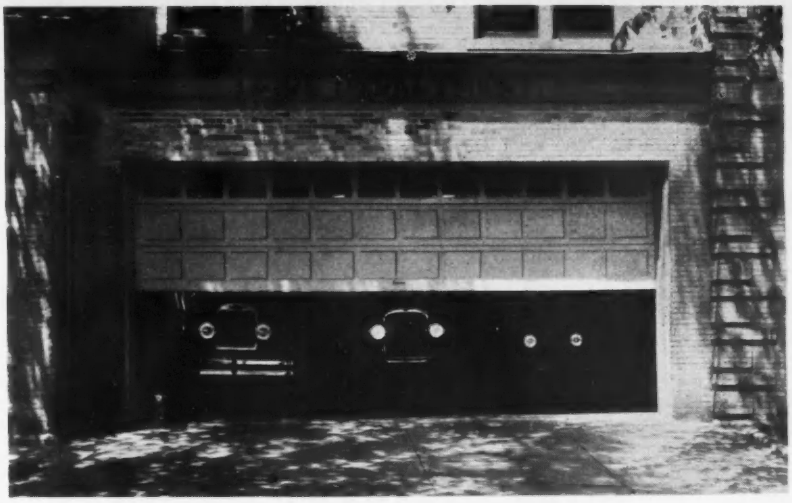
EDWARD E. O'NEILL has been elected President of the American-LaFrance-Foamite Corporation. He has been identified with the company for 24 years during which he has held many important positions having been in charge of fire protection equipment sales and, since 1935, General Sales Manager. William M. Cooper comes to the company as Vice President and Comptroller.

SOMETHING new in emergency lights has been announced by Triumph Explosives, Inc., of Elkton, Md. The new lights are operated by self-contained batteries of new design. Chemicals in the battery are packed in a dry state and do not become energized until the bottom of the battery is struck against some solid object.

ANSWERS

To Dust Explosion Quiz on Page 7

(1) False. (2) False. (3) False. (4) False. (5) True. (6) True. (7) False. (8) False. (9) False. (10) True. (11) False. (12) True. (13) True. (14) False. (15) True. (16) True. (17) False. (18) False. (19) True. (20) True. (21) True. (22) True. (23) True. (24) True. (25) False.



For Fire Departments Large and Small, The Barcol OVERdoor Suits them All!

LOOK FOR BARCOL THIS MARK

WE show a typical Fire Station in West Bend, Wisconsin. The door is a single Barcol OVERdoor of standard construction, made to fit the opening, and electrically operated. Other stations often use one or more doors of smaller size. The Barcol OVERdoor will give you thorough protection for your equipment, easy operation, durability, and very low maintenance cost. Please write for particulars.

BARBER-COLMAN COMPANY, ROCKFORD, ILL.

DETECTS FIRE IN ITS INFANCY

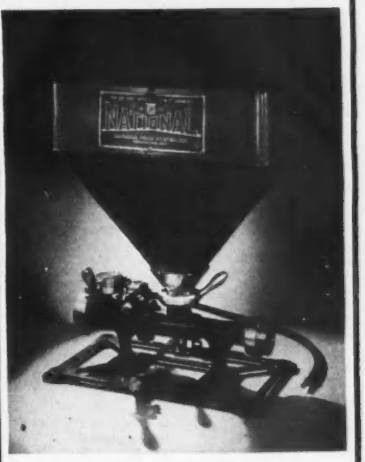
"FIRE-CRY"
AUTOMATIC
FIRE ALARM

The ultimate in thermostatically controlled, spring-operated individually contained, fire detection devices and the only one of this classification which bears the approval of Underwriters' Laboratories.

—A marvelous alarm in a field where there is unquestionably a great need for such an economically priced fire detection service.

For Further Information and Dealers' Proposition write

THE FYR-FYTER COMPANY
Dept. 20-49 DAYTON, OHIO



"SF-21" Fire Department Type Capacity 1200 Gallons of foam per minute

Invertible hopper for running board mounting

NATIONAL-FOMON
Generators and Chemicals
NATIONAL FOAM SYSTEM
INCORPORATED
Philadelphia, U. S. A.

Roster of Fire Companies and Departments Making 5,

The total membership in the Volunteer Firemen's Section of the N.F.P.A. is 15,265 firemen from the 695 companies and departments listed below. Departments having the same name as the town they serve are listed under that name alone.

UNITED STATES

Alabama

Bessemer.

Arizona

Southwest Lumber Mills, Inc., Fire Dept., McNary.
Safford.
Tempe.
Warren.
Yuma No. 1.

Arkansas

Monticello.
Paragould.

California

Arcadia.
Tide Water Associated Oil Co., Associated
Belmont.
Ben Lomond.
Brawley Firemen's Assn.
Carmel.
Carpinteria.
Chowchilla.
Coachella.
Davis.
Del Paso-Robla Fire District.
El Centro.
El Monte.
Escalon.
Folsom.
Fortuna.
Greenville.
Castro Valley Fire Club, Hayward.
Hollister.
Laguna Beach.
Lindsay.
Lomita Park Fire District.
Menlo Park Fire District.
Mount Shasta.
Mountain View.
Palm Springs.
Portola.
Red Bluff.
Rio Vista.
Sanger.
San Juan Fire Dept., San Juan Bautista.
Santa Paula.
Saratoga.
Seal Beach.
South San Francisco.
David A. Curry Club of Yosemite Park and County Fire Dept., Yosemite National Park.
Yreka.

Colorado

Climax Molybdenum Co., Climax.
Fairplay.
Florence No. 1.
Fort Morgan.
Sterling.

Connecticut

Bloomfield Center Vol. Fire Co.
Blue Hills Vol. Fire Dept., Inc., Bloomfield.
Trumbull Vol. Fire Co. No. 1, Bridgeport.
East Port Chester.
Muddy Brook Fire Dept., East Woodstock.
Mansfield Vol. Fire Co.
New Departure Division, General Motors Corp., Meriden.
Russell Fire Co., South District Protective Assn., Middletown.
Newington.
Washington Vol. Fire Dept., New Preston.
Lost Acres Fire Dept., North Granby.
Pine Meadow Fire Co., Inc.
Hose Co. No. 2, Putnam.
Rowayton Hose Co. No. 1.
Roxbury.
Turn of River Fire Dept., Stamford.
Watertown.
Wethersfield Fire Co. No. 1.
Woodbridge Vol. Fire Assn., Inc.
Hotchkissville Fire Co., Woodbury.

Delaware

Clayton Fire Co.
Delaware City Fire Co. No. 1, Inc.
Robbins Hose Co. No. 1, Dover.
Seaford.
Citizens' Hose Co. No. 1, Inc., Smyrna.
Hercules Powder Co., Wilmington.

Florida

Belle Glade.
Cocoa.
Delray Beach.
Miami Beach.
Palm Beach.
Sebring.
Stuart.

Georgia

Federal Hardware & Implement Mutuals, Atlanta.

Idaho

Coeur d'Alene.
Lewiston.
Mullan.

Illinois

Brookfield.
Sherwin Williams Co., Chicago.
Crete.
Dundee.
Elmhurst.
Flossmoor.
Fox Lake.
Gilman Fire Co.
Grays Lake.
Gurnee.
Hanover.
Hebron.
Itasca.
Lake Zurich.
Lockport.
Lombard.
Macomb.
Mount Hope - Funks Grove Vol. Fire Dept., McLean.
The Richardson Co., Melrose Park.
Union Fire Co., Millstadt.
Morton.
Mount Pulaski.
Naperville.
Niles.
O'Fallon No. 1.
Park Ridge.
Liberty Fire Co. No. 1, Peru.
Plainfield.
River Forest.
Riverside.
Roselle.
Steger No. 1.
Stockton.
Sycamore.
Troy.
Vandalia.
Western Springs.
Westmont.
Wheaton.
Wilmette.
Winnetka.
Wood River.
Woodstock.

Indiana

Chesterton.
McMillen Feed Mills & Central Soya Co., Decatur.
Galveston.
Garrett.
Ball Band Plant Fire Brigade, Mishawaka

Iowa

Anita.
Armstrong.
Atlantic.
Charlotte.
Clarion.
Coon Rapids.
Decorah.
Denison.
Earlham.
Earlville.
Eldora.
Eldridge.
Fremont.
Grand Junction.
Grinnell.
McGregor Hook & Ladder Co. No. 1.
Onawa.
Sibley.
Waverly.
Webster City.
West Liberty.

Kansas

Burlington.
Garden City.
Jetmore.
Manhattan.
McPherson.
Topeka Township.

Kentucky

London.
Mengel Body Co., Mill Fire Brigade, Louisville.

Louisiana

Haynesville.
Houma Vol. Fire Co. No. 1.
Jennings.
Newellton.
Hope Hook & Ladder Co. No. 1, Opelousas.
Thibodaux.
Ville Platte.

Maine

Triumph Hose Co. No. 1, Berwick.
Calais Hose 1 & 2.
East Machias.
Eastport.
Freeport.
Harrison.
Kittery.
Monson.
Presque Isle.
Richmond.
Rumford.
Scarborough Firemen's Assn.
Springvale.
Strong.

Maryland

Abingdon Vol. Fire Co., Inc.
Bethesda.
Boonsboro Fire Co.
Brooklyn Community Vol. Fire Co., Inc.
Chevy Chase.
United Steam Fire Engine Co. No. 3, Frederick.
Lansdowne Vol. Fire Co. No. 1, Inc.
La Plata.
Orchard Beach.
Rivera Beach Vol. Fire Co., Inc., Pasadena.
Reisterstown Vol. Fire Co., Inc.
Silver Spring.
Snow Hill Vol. Fire Co.
Takoma Park.

Massachusetts

Alert Hose Co., Adams.
Barnstable.
Belchertown.
Bolton.
Dalton.
Dighton.
The American Thread Co., Kerr Mills, Fall River.
Hyannis Fire District.
Niagara Engine Co., Millis.
Monson.
Plymouth Cordage Co., No. Plymouth.
Company No. 1, Marshfield Fire Dept., Ocean Bluff.
Palmer.
Reading.
South Hadley.
Sudbury.
Swampscott.
Truro.
Uxbridge.
Kendall Mills Fire Dept., Walpole.

Michigan

Bengonia Township Vol. Fire Dept., Beulah.
Birmingham.
Blissfield Township.
Constantine.
East Detroit.
Oak Park Fire Dept., Ferndale.
Gladstone.
Cooperative Vol. Fire Fighters Assn., Grand Rapids.
Harbor Springs.
Newaygo.
Olivet.
Reese.
Richville Community Fire Assn.
Rochester.
St. Ignace.
South Range.
Watervliet Paper Co., Fire Dept., Watervliet.
West Branch.

Minnesota

Cleveland.
Columbia Heights.
Ellendale.
Gibbon.
Glenwood.
Grand Rapids.
Jordan.
Keewatin.
Madelia.
Mahtomedi.
Hardware Mut. Fire Ins. Cos., Minneapolis
Moose Lake.
New Ulm Fire Dept., Engine House No. 1.
Nopeming.
Northfield.
North St. Paul.
Olivia.
White Bear Lake.

Missouri

Hermann Fire Co. No. 1.
American Asphalt Roof Corp., Kansas City.

Montana

Columbia Falls Fire Relief Assn.
Cut Bank.
Hamilton.
Ronan.
Roundup.

Nebraska

Blair.
Duncan.
Nehawka.
North Platte.
Wahoo.
Wayne.
West Point.

Nevada

Battle Mountain.
Elko City.

New Hampshire

East Jaffrey.
Franklin.
Gorham.
Littleton.
Peterborough.
Whitefield.
Wolfeboro.

New Jersey

Atco Vol. Fire Co. No. 1, Inc.
Leeds and Lippincott Co., Atlantic City.
Basking Ridge Fire Co. No. 1.
Beach Haven Vol. Fire Co., No. 1.
Rainbow Lakes Vol. Fire Co., Inc., Boonton.
Borough of Middlesex, Bound Brook.
Cedar Knoll Engine Co.
Cedarville.
Chatham.
Clinton Fire Co.
Dover Board of Fire Wardens, Inc.
Dover Fire Engine Co.
The A. P. Smith Mfg. Co., East Orange.
Edgewater.
Gibbstown Vol. Fire Co.
Glen Ridge.
Haddon Hts.
Hammonton Vol. Fire Co. No. 1.
Harrington Park Fire Co. No. 1.
Haworth.
Highlands.
Hohokus.
Defiance Engine Co. No. 3, Hopatcong.
Jamesburg Fire Co. No. 1.
Leonia.
Lincoln Park.
Livingston.
Long Branch.
Hose Co. No. 1, Inc., Madison.
Atlantic County Firemen's Assn., Mays Landing.
Delaware Gardens Fire Co., Merchantville.
No. Merchantville Fire Co.
Community Engine Co. No. 2, Association, Inc., Midland Park.
Millburn.
Lake Parsippany Vol. Fire Co., Morris Plains.
Navesink Hook & Ladder Co.
Pittsburgh Plate Glass Co., Newark.
North Brunswick Engine Co. No. 1, New Brunswick.
Welcome Vol. Fire Co., Oaklyn.
Oradell.
Fire Protection and Safety Division, Wright Aeronautical Corp., Paterson.
Pequannock.
Rockaway.
Stanhope Hose Co.
Roxbury Chemical Engine Co. No. 1, Succasunna.
Teaneck.
Towaco.
Lake Hiawatha Vol. Fire Assn., Inc., Parsippany, Troy Hills.
Engine Company No. 1, Verona.
Wenonah Fire Co. No. 1.
West Caldwell.
Thomas A. Edison, Inc., West Orange.
East Hanover Vol. Fire Co., Whippany.

New Mexico

New Mexico State Firemen's Assn., Albuquerque.
Hobbs.
E. Romero Hose & Fire Co., Las Vegas.
Taos.

New York

Allegany Engine Co. No. 1.
Firth Carpet Co., Fire Dept., Auburn.
Ausable Forks.
Bainbridge.
Bellmore.
Bohemia.
Union Corners Engine & Hose Co., Bronxville.
Remington Rand, Inc., Buffalo.
Canajoharie.
Canisteo.
Canton Engine House No. 1.
Central Square Fire Co.
Protection Hose Co. No. 7, Chateaugay.
Officers' Assn. of the Eastchester Fire Dept.
East End Vol. Fire Co., Inc., East Farmingdale.
Wm. C. Edmonds Fire Co., East Otto.
East Rockaway.
West Harrison Independent Fire Co., East White Plains.
Elmont East End Chemical Engine & Hose Co.
O. L. Davis Fire Co. No. 1, Endwell.
Fallsburg Fire Dept. No. 1.

5,000 Members of The Volunteer Firemen's Section

Firemen's Assn. of The State of New York, Fort Edward.
Excelsior Hook & Ladder Co. No. 1, Freeport Fire Dept.
Garden City.
Glenwood Hook & Ladder, Engine & Hose Co., Glenwood Landing.
Vigilant Engine, Hook & Ladder Co., Great Neck.
Greenport.
Hammond.
Hastings-on-Hudson.
Holbrook.
King Ferry Fire Co.
Liberty.
Board of Fire Control of Malverne.
Menands Fire Co. No. 1.
Nassau County Fire Commission, Mineola.
The Minetto Vol. Fire Corp.
Narrowsburg.
Du Pont Fabrikoid Div., Newburgh.
Hooker Electrochemical Co., Niagara Falls.
Kimberly-Clark Corp., Fire Brigade, Niagara Falls.
Maydole Hose Co. No. 2, Norwich.
Oceanside.
Excelsior Fire Engine Co., Pearl River.
Pelham Manor.
Pine Plains Hose Co. No. 1.
The Port Dickinson Fire Co. No. 1.
Protection Engine Co. No. 1, Port Washington.
Fairview Fire Co., Poughkeepsie.
Red Hook Fire Co., Inc.
Greece Ridge Fire Dept., Inc., Rochester.
South Shore Vol. Fire Departments Association of Long Island, Inc., Roosevelt.
Edgewood Hose Co. No. 2, Rotterdam.
St. James.
Sayville.
Scarsdale Fire Co. No. 1.
Niagara Engine Co. No. 6, Schoharie.
Selkirk Fire Co.
Setauket.
Sidney.
Solvay.
North Sea Fire Dept., Southampton.
Hillcrest Fire Co. No. 1, Spring Valley.
Stanford Fire Co., Stanfordville.
Stewart Manor.
Syosset.
Tappan Vol. Fire Assn.
Riverside Hose Co. No. 4 of Tarrytown.
Hook & Ladder Co. No. 1, Valley Stream.
Verplanck Fire Dist.
Wantagh.
Amherst Fire Council, Williamsville.
Erie County Vol. Firemen's Assn., Williamsville.
Worcester Hose Co.
Wurtsboro Fire Co. No. 1.

North Carolina

Albemarle.
Dunn.
Enka.
Pinehurst.
Roanoke Rapids.
R. J. Reynolds Tobacco Co., Winston-Salem.

North Dakota

Carrington.
Devils Lake.
Hatton.
Hunter.
Jamestown.
Valley City.
Zeeland.

Ohio

Belpre.
Byesville.
Community Vol. Fire Dept., Cadiz.
Canfield.
Cheviot.
Gates Mills.
Granville.
Groesbeck.
Peters Cartridge Division, Remington Arms Co., Kings Mill.
Kirtland.
Madeira.
North Canton.
Smithville Community Fire Co.
Spencer.
Strongsville.
Swanton.
Utica Vol. Fire Co.
Warrensville Hgts.
West Milton.
Richfield Township Fire Dept., West Richfield.

Oklahoma

Norman.
Stillwater.
Stillwater Safety Council.

Oregon

Beaverton.
Bend.
Canby.
Condon.
Elgin.
McMinnville.
Multnomah No. 3.
North Bend.
Park Rose Fire Dept., Portland.
Roseburg.
Sublimity.

Pennsylvania

Albion.
Union Fire Assn., Bala Cynwyd.
Bareville Fire Co. No. 1.
Fairview Vol. Fire Dept., Bellevue.
Berwyn Fire Co. No. 1.
Bryn Athyn Fire Co.
Buck Hill Vol. Fire Co., Buck Hill Falls.
Pleasant Valley Vol. Fire Co., Canonsburg.
The Collingdale Vol. Fire Co. No. 1.
Dover Union Fire & Hose Co. No. 1.
East Lansdowne Fire Co. No. 1.
Emaus Fire Co. No. 1.
Finleyville.
Fogelsville Vol. Fire Co. No. 1.
East Bethlehem Township Vol. Fire Co., Fredericktown.
Fredonia.
Hose Co. No. 2, Greensburg.
Hose Co. No. 3, Greensburg.
Hershey Vol. Fire Co.
Longwood Fire Co., Kennett Square.
American Fire Co. No. 1, Lansford.
Latrobe.
Linwood Fire Co. No. 1.
Animal Trap Co. of America, Lititz.
Llanerch Fire Co.
Malvern Fire Co.
Millersville Fire Co.
Millvale.
United Fire Co., Montrose.
Friendship Fire Co. No. 1, Mount Joy.
Del. County Firemen's Assn., Newtown Square.
Newtown Square Fire Co. No. 1.
N. Belle Vernon.
Oakmont Fire Co. No. 1.
Citizens Fire Co. No. 1, Palmyra.
Lebanon County Firemen's Assn., Palmyra.
Reliance Fire Co. No. 1, Phillipsburg.
American Radiator & Standard Sanitary Corp., Pittsburgh.
H. J. Heinz Co., Pittsburgh.
Pittsburgh Plate Glass Co., Pittsburgh.
Jenkins Township Vol. Hose Co. No. 1, Pittston.
Pocono Manor Association, Pocono.
Empire Hook & Ladder Co., Pottstown.
Prospect Park Fire Co. No. 1.
Quarryville Fire Co.
Goodwill Fire Co. No. 1, Hyde Park, Reading.
Leo Independent Fire Engine Co. No. 1, Red Lion.
Ridley Park Fire Co. No. 1.
P. H. Glatfelter Co., Spring Grove.
West End Fire Co., Stowe.
Phoenix Fire Co. No. 2, Stroudsburg.
Brookline Fire Co., Upper Darby.
Upper Darby Fire Co. No. 1.
Warren State Hospital.
Waynesburg Vol. Fire Co.
Wellsboro.
Fire Prevention Committee of the Chester County Firemen's Assn., West Chester.
Good Will Fire Co. No. 2, West Chester.
Eberle Fire Brigade, Eberle Tanning Co., Westfield.
West Central Berks Dist., West Lawn
West View Fire Co. No. 1.
Windber Fire Co. No. 1.
Yeadon Fire Co. No.1.
Vigilant Fire Co. No 1, York.

Rhode Island

Defiance Engine & Hose Co., Bristol.
Pawtuxet Vol. Fire Co., Cranston.
Pocasset Fire Engine Co., Cranston.
Greenwood Vol. Fire Co. No. 1.
Manville Fire Dept. Assn.
Woonasquatucket Valley Firemen's League, Marieville.
North Cumberland Vol. Fire Dept.
Oaklawn.
North Kingstown Fire Dept., Wickford.

South Carolina

Easley.

South Dakota

Avon.
Faith.
McLaughlin.
Philip.
Pierre.
Redfield.
Scotland.
Tripp.
Elliott Hose Co. No. 1, Tyndall.
Wilmot.

Tennessee

Brownsville.
Tennessee Valley Authority, Chattanooga.
Kingsport.
Tennessee Eastman Corp., Kingsport.
Draughon's Fire Dept., Inc., Nashville.
Sevierville.
Sparta.

Texas

Beeville.
American Legion Vol. Fire Dept., Carrizo Springs.
Cooper.
Denton.
Freer.
Henderson.
Jacksonville.
Kenedy.
Kilgore.
Kingsville.
Luling.
Matador.
McCamey.
New Braunfels.
Pilot Point Hose Co. No. 1.
Rockport.
Alamo Heights Vol. Fire Dept., San Antonio.
Texas City.

Utah

Bingham No. 1, Bingham Canyon.

Vermont

Enosburg Falls.
Milton.
Vermont Marble Co., Proctor.
Windsor.

Virginia

John H. Enders Fire Co., Berryville.
Big Stone Gap.
Charlottesville.
Chase City Vol. Fire Co.
Franklin.
Front Royal Relief Fire Dept.
Herndon.
Orange.
Chesapeake & Ohio Railway, Richmond.
Shenandoah.
Vinton.
Warrenton.
Waynesboro.

Washington

Cathlamet.
Cle Elum.
Everson.
Mukilteo.
Pomeroy.
Port Angeles.
Poulsbo.
Pullman.
Western States Firemen's Assn., Seattle.
Twisp.

West Virginia

Citizens Fire Co., Charles Town.
Independent Steam Fire Co., Inc., Charles Town.
Petersburg Fire Co.
Shinnston.
Westvaco Chloride Products Corp., South Charleston.
Terra Alta Vol. Fire Co.
Weston.

Wisconsin

Algoma.
Barron.
Cassville Vol. Fire Co.
Coon Valley Village Vol. Fire Co.
Delavan Lake.
Genoa City-Bloomfield.
Horicon.
Kimberly.
Kohler.
Lake Geneva.
Lodi.
Luxemburg.
Menomonie.
Milton Junction.
Lake Fire Dept., Milwaukee.
Mosinee.
Neillsville.
Nekoosa.
Prairie du Sac Vol. Fire Co.
Randolph Vol. Fire Co.
River Falls.
Twin Lakes.
Waterloo.
West Bend.
Weyauwega.
Kilbourn Fire Dept., Wisconsin Dells.

Wyoming

Basin.
Evanston.
Rawlins.
Rock Springs.

Alaska

Anchorage.
Ketchikan.
Seward.

NEWFOUNDLAND

Anglo-Newfoundland Development Co., Ltd., Grand Falls.

CANADA

Alberta

Brooks.

British Columbia

Chilliwack.
Courtenay.
Duncan.
Grand Forks.
Kelowna Vol. Fire Brigade.
Merritt.
Silbak Premier Mines, Ltd., Premier.
Salmon Arm.
Stewart.
Vernon.

New Brunswick

Campbellton Fire Brigade.
Canadian Cottons, Ltd., Gibson Mills, Marysville.
St. George.
St. John.
St. Stephen.

Nova Scotia

Amherst Fire Brigade.
Bridgewater.
Dominion.
Kentville.
Liverpool Fire Co.
Lunenburg.
New Waterford.
Sydney.

Ontario

Burlington.
Chapleau Fire Co.
Comber.
Cornwall Vol. Fire Brigade.
Beatty Bros., Ltd., Fire Dept., Fergus.
Haileybury.
Humber Bay Vol. Firemen.
Huntsville.
Lakefield.
Leaside Vol. Fire Brigade.
New Liskeard.
New Toronto.
Falls View Hose Brigade, Niagara Falls.
Nipigon Fire Brigade.
Oakville.
Petrolia.
Porcupine.
Algoma Steel Corp., Ltd., Sault Ste. Marie.
Schumacher.
South Porcupine.
Protection Hose Co. No. 1, Thorold.
Imperial Varnish & Color Co., Fire Brigade, Toronto.
Waterloo.
Windsor.

Quebec

Canadian Industries, Ltd., Brownsburg.
Atlantic Sugar Refineries, Montreal.
Canadian Industries, Ltd., Montreal.
Noranda Fire Brigade.
Noranda Mines' Fire Dept., Noranda.
Aluminum Co. of Canada, Ltd., Quebec.
Rouyn.

Saskatchewan

Firemen's Vol. Brigade, Gravelbourg.
Rosetown Fire Brigade.
Weyburn Fire Brigade.

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PYRENE PRIZE LETTER CONTEST

EACH month three cash awards are given jointly by the Pyrene Manufacturing Company of Newark, New Jersey, and VOLUNTEER FIREMEN to firemen who write the best letters telling of effective work done with approved fire extinguishers. The prizes are: first, $10.00; second, $3.00; and third, $2.00. To win one of the prizes does not require any fancy writing ability. If you know of a fire where good work was done with an extinguisher just tell the facts in your own way. The contest is open to members of fire departments including organized industrial brigades. Read the contest rules below. Next month perhaps your name will be among the prize winners.

FIRST PRIZE—$10.00

MALCOLM APPLETON

Junior Volunteer Fire Department
Warrenton, Virginia

Quick Thinking

In Warrenton High School three years ago a moving picture was being shown to 250 students in a basement auditorium. The projector was set up in the back of the room, surrounded by heavy curtains which served as a booth.

When the picture had been running for some time, and the entire audience was thoroughly wrapped up in it, the projector stopped suddenly. The operator of the machine shouted, "Fire!" As the students turned around and saw the flames they started a stampede for the exits, falling over chairs and knocking each other down as they went. The only exits available were two separate stairways four feet wide, each consisting of about thirty steps up. The excited students jammed each.

Meanwhile the fire in the projector was spreading to the heavy curtains and there seemed no hope that it could be stopped. A soda-acid extinguisher was hanging from the wall, however, and a member of the faculty grabbed it. He played it on the fire and soon extinguished the flames. We all felt afterwards that the handy extinguisher and the quick thinking of that member of the faculty prevented a serious fire and possibly loss of life.

SECOND PRIZE—$3.00

WILLIAM C. PURDY

Central Fire Station
Hudson, Mass.

Saved a Life, Automobile, and Place of Business

One of our alert call-men who drives a tank truck for a living drove his truck into a filling station to deliver a tank load of gasoline. The attendant was pumping gas to a customer's car at the time. He happened to strike the nozzle of his hose against a bare spot in the tail light wire. There was a hot electric spark and flames shot out from the rear of the car.

The customer was so excited he didn't know what might happen next. The attendant got the scare of his life. Our call-man saw the fire burning on the end of the hose, on the back of the car, on the tank, and on the attendant's sleeve. He shut off the gas pump, rushed for his small carbon tetrachloride extinguisher which he carried in the cab of his tank truck, put out the fire on the attendant, put the hose fire out, and extinguished the brightly burning fire on the tank and back of the car.

The call-man deserves credit and praise for keeping cool and thinking fast. It was entirely due to him and the extinguisher that the only damage was scorched paint on the gas pumps and back of the car, a burned sweater, and a singed arm.

THIRD PRIZE—$2.00

ELMER E. HOBBS, *Chief*

Protection Hose Company No. 7
Chateaugay, N. Y.

Looked Bad for a While

One day last spring our department was called to a home fire in the neighboring village of Brainardsville. When we got there we found that the owner had completely extinguished the fire with a 2½-gallon soda acid extinguisher. Here is the story as he told it in a letter to our department the day after the fire.

"I am very sorry to have caused so much disturbance yesterday but it did look for a few minutes as though I might need your help. The smoke was coming through the rugs in our living apartment and it looked as if the fire had gotten between the floor and ceiling. If it had, our extinguisher got it.

"I am glad we did not need your help, but I do appreciate your willingness to come. I am enclosing a small check for your use. Wish it could be a lot more."

Had this fire gotten away, it might have threatened the whole small community for it is an area without fire protection.

HONORABLE MENTION

GEORGE H. ROBINSON, Batesville Fire Department, Batesville, Arkansas.

LYNN L. HYDER, Fire Department, Johnson City, Tennessee.

FREDERICK J. STURDIVANT, Clio Fire Department, Clio, Michigan.

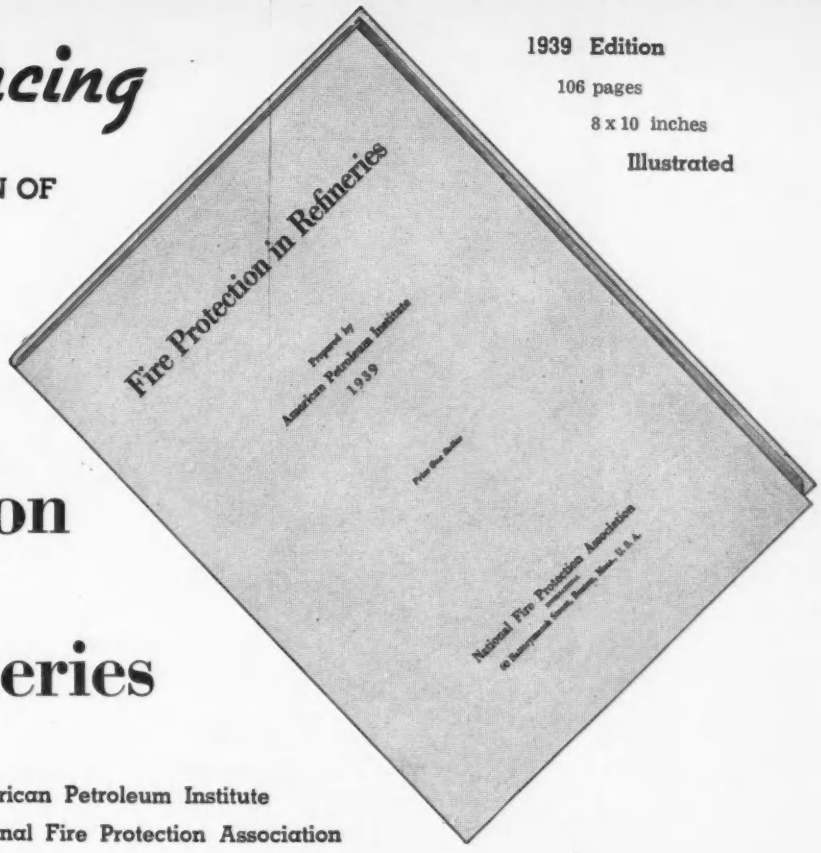
CONTEST RULES

1. Contestants in the Pyrene Prize Letter Contest must be members of their local fire department.
2. Letters are to describe actual experiences where an approved fire extinguisher of any make has saved lives or property.
3. Trade names may be used but will be deleted in publication. Publishers reserve the right to edit winning letters to permit publication.
4. Each contestant automatically vouches for the truth of the facts presented from his own or others' experience.
5. Only one letter may be submitted each month.
6. Letters must be legibly written in ink or typewritten on white paper, one side only. Preference will be given to letters not over 250 words in length.
7. Letters received after the 8th of the month will be judged in following month's competition.
8. Monthly prizes in cash will be: 1st, $10.00; 2nd, $3.00; and 3rd, $2.00.
9. Address contest letters to Pyrene Prize Letter Contest, National Fire Protection Association, 60 Batterymarch St., Boston, Mass.

Announcing

AN N.F.P.A. EDITION OF

Fire Protection in Refineries



1939 Edition

106 pages

8 x 10 inches

Illustrated

Prepared by American Petroleum Institute

Distributed by the National Fire Protection Association

CONTENTS

Fire. Vaporization of Petroleum—Combustible or Explosive Mixture—Ignition of Combustible Mixture—Combustion—Conclusions.

Fire Prevention. I. Design. Layout—Selection of Refinery Site. Location of Facilities — Block System — Administrative Buildings — Service Facilities — Shops—Process Units—Tanks—Design of Structures, Buildings and Facilities. **II. Operation.** Employee Rules and Regulations—Normal and Emergency Operations. **III. Maintenance.** Structures, Equipment and Hazards—Good Housekeeping.

Fire Control and Extinguishment. I. Equipment—First Aid Fire Appliances—Communications — Water System — Oil Transfer Pumps—Chemical Extinguishing Systems (foam, CO_2, steam). **Fire Fighting Organization. II. Fire Fighting Practices.** Administration—Analysis of Fires—Fire Fighting (water, foam, steam) — Limiting Spread of Fire — Sparks and Brands—Direct Flame—Radiant Heat—Flow of Oil (Boil-overs)—Propagation of Flame Through Vapor-Air Mixtures — Explosion — Toppling Structures—Salvage.

Appendix. Refinery Layout—Diking—Fire Stops — Fire Permits — tables, diagrams and photographs of typical fire protection equipments—Typical Procedure for Handling Tank Fires.

If there is an oil refinery in your community or near enough so that you may one day be called upon to fight a fire in it, you will want a copy of this new publication. It contains a wealth of good general information of value in connection with any fire in an oil property. Prepared by the Fire Prevention Committee of the American Petroleum Institute (member N.F.P.A.) it is made available by the National Fire Protection Association to its members as the best available information on the technical and specialized subject of fire protection in refineries.

The N.F.P.A. has not felt called upon to prepare an association standard on the subject. It is of concern only in the limited number of places where refineries are located and a complete understanding of the fire problem in this occupancy involves a more detailed knowledge of petroleum technology than is within the experience of the average firemen or fire protection engineer. However, the subject has shown itself to be of great general interest and the N.F.P.A. is happy to cooperate with the American Petroleum Institute in bringing the best information on it to the attention of its members.

This new book will make a valuable addition to any fire library. For convenience in ordering use the order form below.

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